AUC = $\frac{Co}{K}$ = $\frac{Dose}{K.Vd}$

AUC = $\frac{C_2+C_1}{2} \cdot (t_2 - t_1)$

$AUC_{last}^{\infty} = \frac{C_{last}}{K}$

$AUC_0^{\infty} = \frac{Co}{K}$

Y = mx +b

Slope = $\frac{Y_2-Y_1}{X_2-X_1}$

Slope = $\frac{-K}{2.303}$

Slope = $\frac{\log C_1 - \log C_2}{t_1-t_2}$

K= $-Slope \cdot 2.303$

$-K = \frac{\ln C_1 - \ln C_2}{T_1 - T_2}$

$C = C_0 \cdot e^{-kt}$

$C = \frac{D}{V_d} e^{-kt}$

$C_0 = \frac{X_0}{V_d}$

$V_d = \frac{X_0}{C_0} = \frac{D}{C_0}$

$C_0 = \frac{C*}{e^{-kt}}$

$t_{half} = \frac{\ln 2}{K} = \frac{0.693}{K}$

$t = \ln\left(\frac{C_0}{C*}\right) / K$

$CL = \frac{dose}{AUC}$

$CL = K \cdot V_d$

$\frac{1 - e^{-kt}}{e^{-kt}}$

Intravascular route

Multiple dose I.V bolus

$C_n = r\left(\frac{D}{V} e^{-kt}\right)$

$r = \frac{1 - e^{-nKT}}{1 - e^{-KT}}$

$C_{SS} = R\left(\frac{D}{V} e^{-kt}\right)$

$R = \frac{1}{1 - e^{-kt}}$

$C_N^{max} = r\left(\frac{D}{V}\right)$

$C_{ss}^{max} = R\left(\frac{D}{V}\right)$

$C_N^{min} = r\left(\frac{D}{V} \cdot e^{-kt}\right)$

$C_{ss}^{min} = R\left(\frac{D}{V} \cdot e^{-kt}\right)$

$C_{ss}^{avarage} = \frac{X_0}{KVd\tau}$

$n\tau = -1{,}44 \ t0.5 \ \ln(1 - f_{ss})$

$f_{ss} = e^{-KT}$

Loading Dose

$LD = \frac{MD}{e^{-Kt}}$ $D_L = C_{ss}^{max} \cdot Vd$

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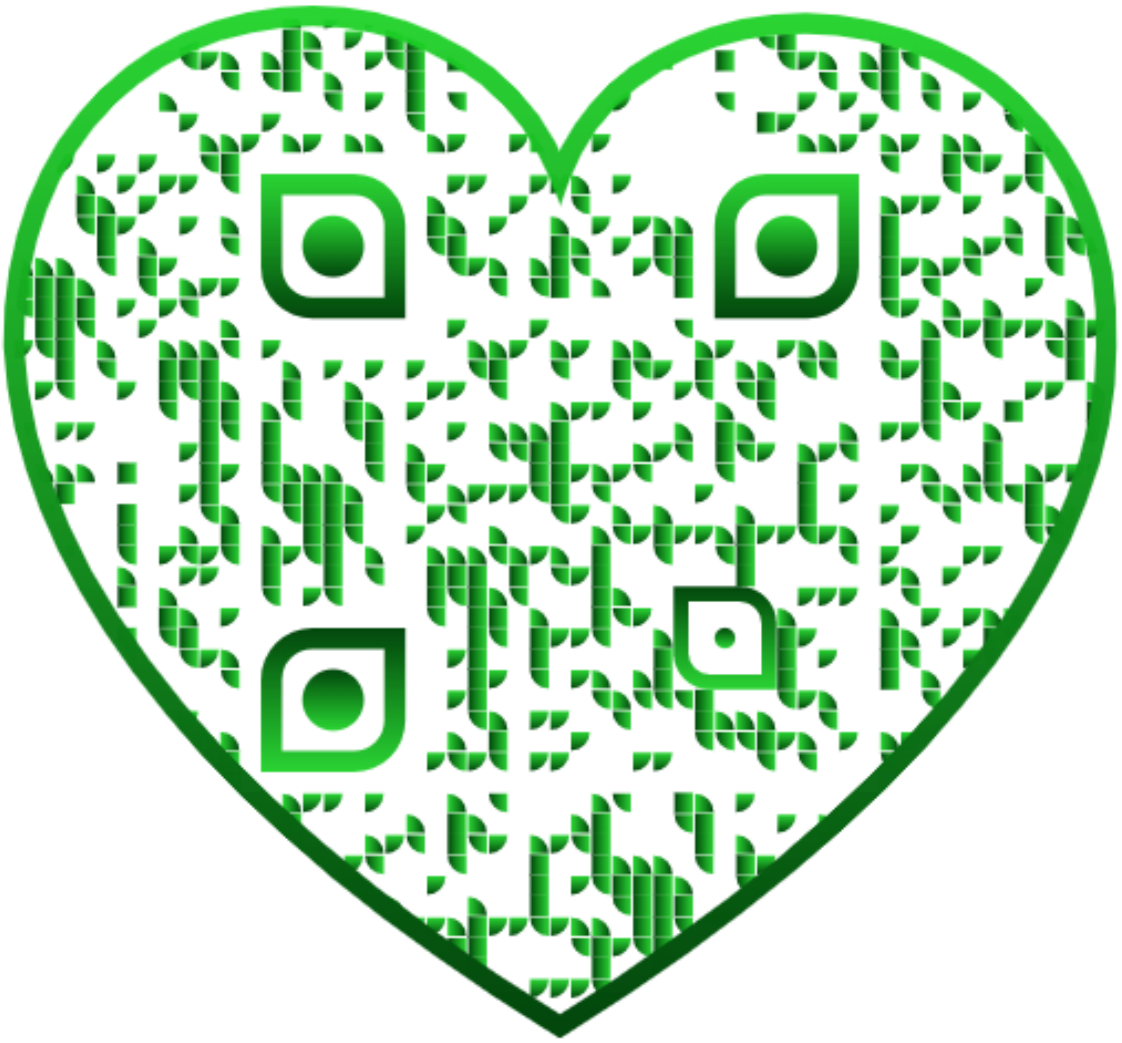

Tow compartment I.V bolus

$$D_P = D_P^0 \left[\frac{(\alpha - K_{21})}{\alpha - \beta} e^{-\alpha t} + \frac{(K_{21} - \beta)}{\alpha - \beta} e^{-\beta t}\right]$$

$$C_P = D_P^0 \left[\frac{(\alpha - K_{21})}{V_P\,(\alpha - \beta)} e^{-\alpha t} + \frac{(K_{21} - \beta)}{V_P(\alpha - \beta)} e^{-\beta t}\right]$$

$$C_P = Ae^{-\alpha t} + Be^{-\beta t}$$

$$A = \frac{D_0(\alpha - K_{21})}{V_P(\alpha - \beta)}$$

$$B = \frac{D_0(K_{21} - \beta)}{V_P(\alpha - \beta)}$$

$$Dt = \frac{C_P^0 \cdot K_{12}}{(\alpha - \beta)}(e^{-\beta t} - e^{-\alpha t})$$

$$D_t = \frac{K_{12} \cdot D_P}{K_{21}}$$

$$V_P = \frac{D_0}{A + B}$$

$$V_t = \frac{V_P \cdot K_{12}}{K_{21}}$$

$$(Vd)ss = V_P + \frac{K_{12}}{K_{21}} \cdot V_P$$

$$K_{12} = \frac{AB\,(\beta - \alpha)^2}{(A + B)(A\beta + B\alpha)}$$

$$K_{21} = \frac{A\beta + B\alpha}{A + B}$$

$$K = \frac{\alpha\beta(A + B)}{A\beta + B\alpha}$$

$$AUC = \frac{A}{\alpha} + \frac{B}{\beta}$$

Multiple dosing extravascular administration

$$C_n = \frac{K_a F X_0}{Vd\,(K_a - K)} \left[\frac{(1 - e^{-nK\tau})\,e^{-Kt}}{1 - e^{-K\tau}} - \frac{(1 - e^{-nK_a\tau})\,e^{-K_a t}}{1 - e^{-K_a\tau}}\right]$$

$$C_{SS} = \frac{K_a F X_0}{Vd(K_a - K)} \left[\frac{e^{-Kt}}{1 - e^{-K\tau}} - \frac{e^{-K_a t}}{1 - e^{-K_a\tau}}\right]$$

$$(t_p)n = \frac{2.303}{K_a - K} \log\left[\frac{K_a(1 - e^{-nK_a\tau})}{K(1 - e^{-nK\tau})} \cdot \frac{1 - e^{-K\tau}}{1 - e^{K_a\tau}}\right]$$

$$(t_p)ss = \frac{2.303}{K_a - K} \log\frac{K_a(1 - e^{-K\tau})}{K(1 - e^{-K_a\tau})}$$

$$R = \frac{1}{1 - e^{-K\tau}}$$

$$f_{ss} = 1 + \frac{K \cdot e^{-nK_a\tau}}{Ka - K} - \frac{K_a \cdot e^{-nK\tau}}{K_a - K}$$

$$n\tau = -1.44\ \ t0.5\ \ \ln(1 - f_{ss})$$

$$C_{ss}^{avarage} = \frac{F X_0}{K V_d \tau} = \frac{F X_0}{CL\,\tau}$$

Nonlinear pk

$$R = \frac{V_{max} \cdot (C_P)ss}{K_m + (C_P)ss}$$

$$(C_P)ss = \frac{V_{max} \cdot R}{K_m - R}$$

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Clearance

$$CL = \frac{dX/dt}{C_P}$$

$$dX/dt = CL * C_P$$

$$CL = K \cdot V_P$$

$$CL = \frac{D_0}{AUC}$$

Renal clearance $(CL_R) = K_e \cdot V_d$

Bile clearance $(CL_b) = K_b \cdot V_d$

Hepatic clearance $(CL_h) = K_m \cdot V_d$

Body clearance $(CL_T) = (K_e + K_b + K_m)V_d$

$$K_e = K \cdot \frac{D_u}{M_u + D_U}$$

$$K_m = K \cdot \frac{M_u}{M_u + D_U}$$

$$K_m = K - K_e$$

$$CL_h = CL_T - CL_R$$

Extravascular route

$$C_P = \frac{K_a F X_0}{Vd\,(K_a - K)}[e^{-Kt} - e^{-K_a t}]$$

$$t_{max} = \frac{2.303}{(K_a - K)} \log \frac{K_a}{K}$$

$$C_{max} = \frac{K_a F X_0}{Vd\,(K_a - K)}[e^{-Kt_{max}} - e^{-K_a t_{max}}]$$

$$CL = \frac{FX_0}{AUC}$$

$$Vd = \frac{FX_0}{K \cdot AUC}$$

$$AUC = \frac{FX_0}{K\,Vd}$$

$$F \cdot Dose_{oral} = CL \cdot AUC_{oral}$$

$$F \cdot = \frac{AUC_{oral}}{AUC_{I.V}} \cdot \frac{dose_{I.V}}{dose_{oral}}$$

$$F. = \frac{AUC_{oral}}{AUC_{I.V}}$$

One compartment I.V infusion

$$C_P = \frac{R}{Vd \cdot K}(1 - e^{-kt})$$

$$C_{P\infty} = \frac{R}{Vd \cdot K}$$

$$C_{Pss} = \frac{k_0}{V_d \cdot K}$$

$$K_0 = C_{Pss} \cdot V_d \cdot K$$

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